



Scott County Traffic Management System

Concept of Operations

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1. Introduction

Scott County is developing a Traffic Management System (TMS) to address transportation safety and mobility challenges associated with event oriented traffic around the interchange of County Road (CR) 83 and US Highway (Hwy) 169 within the City of Shakopee. The management of traffic in this area involves transportation agencies at the city, county and state levels, as well as local law enforcement and businesses that generate traffic for large events. **The goal of this project is to actively manage traffic and provide real-time alternate route information to travelers in order to balance traffic in the project area during events, thus reducing safety and mobility issues.**

This document presents a Concept of Operations for the Scott County TMS project. It describes the current system, identifies stakeholders, defines needs, presents an operational concept, proposes system components and describes scenarios for how the system will operate. One of the fundamental objectives of a Concept of Operations is to identify needs in terms that all project stakeholders can understand. The needs expressed in this Concept of Operations were identified by Scott County, key stakeholders and documents relevant to the project. This Concept of Operations also provides a foundation for more detailed analyses that will lead into System Requirements and eventually Design.

1.1 Current Environment

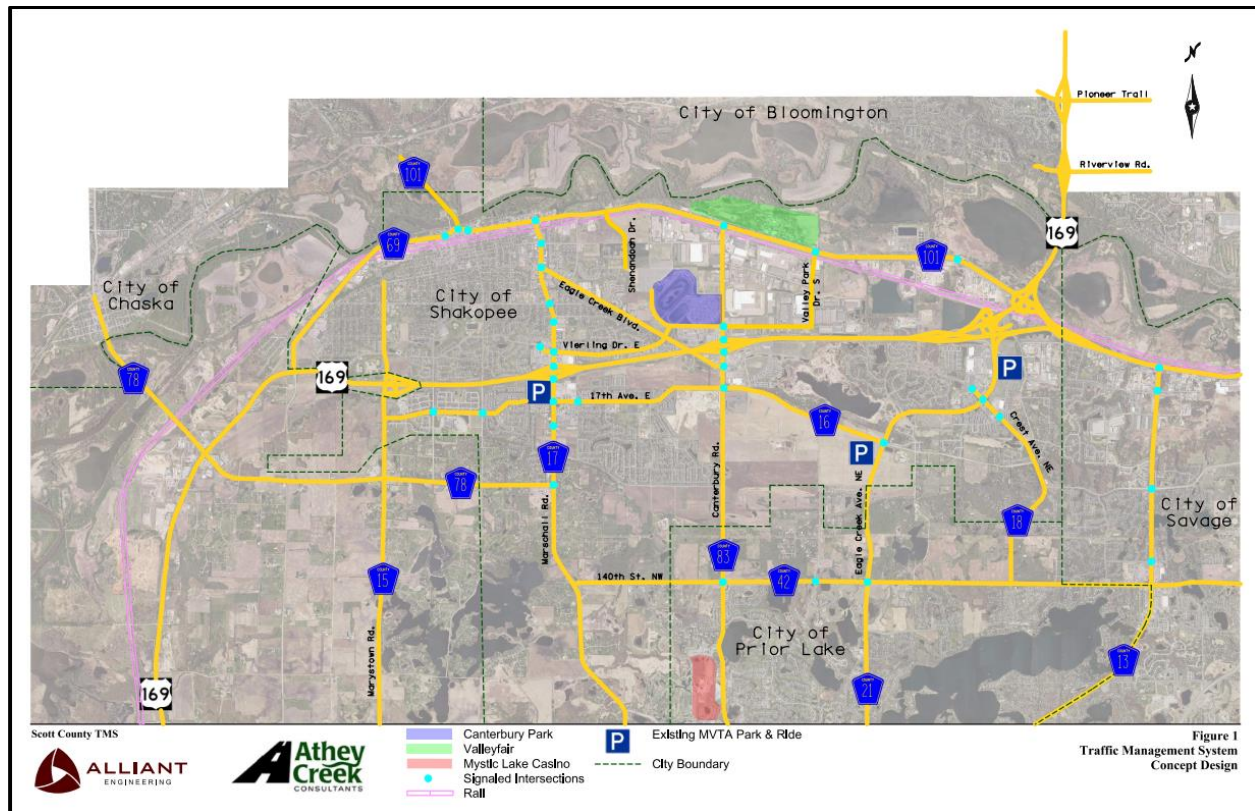
The current environment for managing event traffic in the project area provides context for understanding the needs and conceptual operation of a new system. Located 25 miles southwest of Minneapolis, Shakopee is home to approximately 40,000 citizens, a variety of large industrial businesses, and several regional event venues. The primary route to and from Shakopee is Hwy 169. Hwy 169 is also designated by the Minnesota Department of Transportation (MnDOT) as an interregional corridor between the Twin Cities Metropolitan Area and southwestern Minnesota.¹ As such, it is also a significant route for commercial and weekday commuter traffic.

The area impacted by this project is illustrated in Figure 1. It extends beyond the Hwy 169/CR 83 interchange to County Road (CR) 101 on the north, Hwy 13 on the east, 154th St W on the south, and CR 41 on the west. Shakopee is also bound on the north by the Minnesota River and the Union Pacific Railway line running parallel to CR 101.

These boundaries reflect the alternate routes envisioned for directing travelers away from the Hwy 169/CR 83 interchange during events. Three event venues within the project area routinely attract large numbers of visitors to events that create significant traffic issues around Highway (Hwy) 169 and County Road (CR) 83.

¹ Minnesota Department of Transportation Interregional Corridor System
<http://www.dot.state.mn.us/planning/program/irc.html>, accessed July 11, 2016.

Figure 1 Scott County TMS Project Limits



Canterbury Park Racetrack and Card Casino is home to live racing, simulcast racing and a 24/7 card casino. Canterbury Park is also home to a variety of special events like the Midwest's largest craft show, thrilling snowmobile racing, concerts and more.²



Mystic Lake Casino Hotel has slots, blackjack and bingo. There are 600 hotel rooms, ten bars and restaurants, a spa, and an award-winning golf course. The Mystic Showroom® and Mystic Comedy Club® also host concerts, comedy shows and more.³



Valleyfair Family Amusement Park is the largest amusement park in the upper Midwest more than 75 rides and attractions on 90 acres of land. When the park debuted in 1976, there were 900 seasonal employees and 63 full-time staff. Today, there about 70 year-round employees, and this season, about 1,600 seasonal employees will be hired.



² Canterbury Park Racetrack and Card Casino <http://www.canterburypark.com/>, accessed on July 11, 2016.

³ Mystic Lake Casino Hotel <http://www.mysticlake.com/>, accessed July 11, 2016.

Events held at these venues today are primarily managed by the venue operations staff and the City of Shakopee Police Department. The event venues also work collaboratively through an organization called River South to plan and market events on their properties. The Police Department typically gets involved in traffic management when more than 4,500 visitors are expected to attend an event. The Police Department is contracted by the venue to provide traffic management at key locations during the event. For events that attract over 8,000 visitors to the areas, the event venues have also rented and used portable changeable message signs to support the Police Department's efforts to manage traffic. The portable signs also supplement a wide variety of roadside and venue static signing throughout the project area. As illustrated in Figure 2, much of the existing static signing is old or not prominent enough

Figure 2 Existing Static Signs for Event Venues



to encourage travelers to take alternate routes to and from these venues during events.

As the number of events and popularity of the venues has grown over the years, traffic has increased in the area to a point where backups frequently occur on Hwy 169 and CR 83. There have been some roadway improvements to address the issues and more improvements are planned for the future. For example, the Shakopee Mdewakanton Sioux Community (SMSC) and Mystic Lake Casino worked with MnDOT to add an extended exit lane to Hwy 169 at CR 83. This has provided safer space for traffic when it queues on Hwy 169 but there are still issues with traffic getting through the intersection at CR 83, especially during events at Canterbury Park. During Canterbury Park events, visitors try to use the first available entrance at 12th Ave E. Scott County has added a flashing yellow arrow for traffic turning from northbound CR 83 onto westbound 12th Ave E, and MnDOT has adjusted the signal timing at the Hwy 169 ramps. Additional planned improvements include adding a second left turn lane westbound and northbound, as well as expanding 12th Ave E further west of CR 83 to Disc Drive for two continuous westbound lanes with dedicated turn lanes. CR 83 improvements are also programmed for 2017 at 4th Ave E where additional turn lanes and expansion of CR 83 will accommodate a center median.⁴

Traffic signals throughout the area are managed by both Scott County and MnDOT. The signals are not currently controlled through a central software so changes to signal timing are made by Scott County at the signal and by MnDOT through limited, dial-up phone connections. MnDOT is in the process of procuring a central control software for their traffic signals and it is possible that this software could be

⁴ County Highway 83 (Canterbury Road) Corridor Readiness Study, prepared by Bolton & Menk for the City of Shakopee, p. 24-26, January 27, 2016.

made available to Scott County and other local transportation agencies in the future. Until the option becomes available, the TMS is envisioned to operate as a separate control software.

Further south on CR 83, between CR 42 and CR 82, additional improvements are planned for 2016. The SMSC is working with Scott County to reconstruct CR 83 in this area to address limited capacity, access, driver sight distance and accessibility.⁵ Finally, MnDOT will update signing in 2016 along Hwy 169 from CR 14 to CR 1.⁶

Although these improvements have and will continue to address several geometric issues within the project area, the TMS envisioned by Scott County will further address the event congestion issues by allowing them to actively manage traffic and provide real-time alternate route information to travelers in order to balance traffic during events. It is also important to note that the TMS project is constrained by the requirement to authorize funding for construction by June 2017. Scott County received project funding from the Metropolitan Council through the federal Congestion Mitigation and Air Quality program. As such, construction of the TMS is targeted to begin in Spring 2017 and conclude by Fall 2017.

1.2 Stakeholders

There are a number of stakeholders with traffic management needs around the project area. There are travelers accessing the area on local roadways that are under the jurisdiction of transportation agencies at the city, county, state and tribal levels. There are businesses and regional event venues that can generate high volumes of traffic at times. Following is a list of the primary stakeholders who will most directly interact with the TMS. Each stakeholder is defined for consistent references and according to how they will interact with the system.

- **Travelers:** People visiting the event venues within the project area. All of the other stakeholders are ultimately trying to provide safe, efficient transportation to and from the event venues for these people. There are also commuters who travel through the area during the weekdays and the TMS is envisioned to serve them during incidents.
- **Event venues:** Canterbury Park, Mystic Lake Casino and Valleyfair staff responsible for the operation and administration of the major event venues in the area.
- **Shakopee Mdewakanton Sioux Community (SMSC):** The SMSC is a federally recognized, sovereign Native American tribe. As a sovereign nation, the SMSC government is responsible for infrastructure such as roads, sewers, housing and more. This group also owns and operates the Mystic Lake Casino.
- **City of Shakopee:** City of Shakopee Public Works, Planning and Police Department staff responsible for the safety and efficiency of city streets. The Police Department is expected to be a primary user of the TMS, while the rest of this stakeholder group is expected to be secondary users as needed.
- **Scott County:** Scott County Roads and Transportation, and Information Technology staff responsible for the safety and efficiency of the county roads. This group is expected to install, maintain and be a primary user of the TMS.

⁵ County Highway 83 Improvements <https://www.bolton-menk.com/clients/SMSC/CoHwy83/index.html>, accessed July 12, 2016.

⁶ Minnesota Department of Transportation Construction Plan for Signing, Guardrail Located on T.H. 169 from CR 14 to CR 1, prepared by HDR for MnDOT, January 13, 2016.

- **MnDOT:** Minnesota Department of Transportation staff at the Regional Transportation Management Center and in Traffic Engineering responsible for the safety and efficiency of the state highway. This group is expected to be a secondary user of the TMS.

The challenges and corresponding needs presented in the next section were identified from the perspective of these stakeholders.

2. Needs

This section presents a series of needs that have been identified for the TMS. Needs were identified through discussions with stakeholders and review of key documents associated with CR 83 and other key routes within the project area. The needs are presented in Table 1 first by describing a challenge (column 1) facing one or more of the stakeholders who will be involved in the TMS. Based on each challenge, one or more needs (column 2) are described next. The needs are numbered for identification and traceability purposes.

Table 1 Needs for Scott County TMS

Challenge	Need
A. CR 83 is the focal point of this project. It carries average daily traffic volumes ranging from 18,800 vehicles per day between CH 16 and 12th Ave E and 7,700 per day between 12th Ave E and CH 101.⁷ Although roadway changes have been made to address event traffic impacts, events generating 4,500 visitors or more still present challenges with managing traffic on CR 83, as well as Hwy 169 and other surrounding local roads.	1. Travelers need to know in real-time the safest, most efficient transportation access to major event venues during events generating more than 4,500 visitors.
	2. Event venues, SMSC, Shakopee, Scott County and MnDOT need to dynamically direct Travelers to the safest, most efficient transportation access to major event venues during events generating more than 4,500 visitors.
B. Event congestion or incidents that require traffic management may occur at any time of the day or on any day of the week.	3. Event venues, SMSC, Shakopee, Scott County and MnDOT need to be able to monitor and dynamically direct Travelers 24/7/365.
C. Travelers may be unaware or leery of alternate routes for accessing the major venues, particularly if they are relying on navigation systems for guidance.	4. Travelers need directional signing – both static and dynamic – that is credible and assertive to guide them to alternate access points.
D. Although an additional exit lane was added to Hwy 169 at CR 83 to accommodate higher volumes of arriving event traffic, the lack of double turn lanes onto CR 83 combined with	5. During events, event venues, SMSC, Shakopee, Scott County and MnDOT need to dynamically direct arriving Travelers to alternate routes via CR 101, CR 21 and CR 17.

⁷ County Highway 83 (Canterbury Road) Corridor Readiness Study, prepared by Bolton & Menk for the City of Shakopee, p. 4, January 27, 2016.

Challenge	Need
the short distance to 12 th Ave E, routinely causes backups during events.	
	6. During events, event venues, SMSC, Shakopee, Scott County and MnDOT need to smooth traffic arriving via CR 83.
E. CR 101 is often used as an alternate route when seasonal flooding occurs on CR 41. When this happens, the additional traffic on CR 101 can impact alternate routes for accessing the major event venues.	7. Event venues, SMSC, Shakopee, Scott County and MnDOT need to know when traffic volumes on CR 101 make it an undesirable alternate route for accessing major event venues.
F. Trains using the Union Pacific rail line running parallel to CR 101 can impact alternate routes for accessing the major event venues during events.	8. Event venues, SMSC, Shakopee, Scott County and MnDOT need to know in real-time when train traffic impacts on CR 101 make it an undesirable alternate route for accessing the major event venues during events.
G. Event Venues have successfully used portable dynamic message signs for traffic management during past events but sign rental, permitting and placement arrangements must be made each time. Since the portable signs are currently used only during events, SMSC, Shakopee, Scott County and MnDOT are unable to efficiently use the portable signs when there are incidents that impact traffic.	9. Event venues, SMSC, Shakopee, Scott County and MnDOT need a permanent solution that allows them to dynamically manage traffic during events and incidents.
H. Although the major venues try to avoid overlapping events, they do happen and the traffic impacts can be even more extensive.	10. Event venues, SMSC, Shakopee, Scott County and MnDOT need a process for exchanging event information in advance to prepare for traffic management.
I. As Travelers depart major venues, they tend to navigate to CR 83 which creates long queues for accessing Hwy 169.	11. Event venues, SMSC, Shakopee, Scott County and MnDOT need to dynamically direct departing Travelers to alternate routes via CR 101, CR 21 and CR 17.
	12. Event venues, SMSC, Shakopee, Scott County and MnDOT need to smooth traffic departing via CR 83.
J. There are existing static signs – both roadway and business – along Hwy 169, CR 101, CR 83, CR 17 and CR 21 that direct Travelers to the major venues. However, the signing is older or in some cases not very prominent.	13. Event venues, SMSC, Shakopee, Scott County and MnDOT need existing static signs to support any additional signing that may be used to dynamically direct Travelers to and from the major venues.
K. The Amazon facility off CR 101 and Shenandoah Dr and other large employers with rotating shifts in the area may cause additional traffic impacts during events.	14. Event venues, SMSC, Shakopee, Scott County and MnDOT need to monitor in real-time traffic at key locations during events to understand traffic impacts.
	15. Event venues, SMSC, Shakopee, Scott County and MnDOT need to anticipate future traffic

Challenge	Need
	impacts that may be caused by new businesses operating in the area.
	16. Event venues, SMSC, Shakopee, Scott County and MnDOT need other traffic generators (e.g. MVTA, large employers) in the area to be aware of events so that, when possible, operations (e.g. routes, employee shifts, deliveries) can be modified.

These needs are further referenced in the next two sections as they are used to describe the operational concept and the proposed system components. The need identification number will allow each subsequent reference to be traced back to the original needs and corresponding challenges. The needs will also serve as the basis for developing system requirements for the TMS.

3. Operational Concept

This section describes the operational concept from each stakeholder's perspective and in terms of how the TMS will address their needs. The operational concept is intended to help each stakeholder see how their needs have been interpreted and how the system is expected to address their needs. It is presented in a sequential manner from each stakeholder's perspective, and the original needs and corresponding challenges identified in the previous section are noted in parentheses following each description. Each piece of the description is also numbered for reference purposes. Following the description of the operational concept, this section also includes an overview of the anticipated roles and responsibilities that will be associated with operating and maintaining the TMS.

3.1 Travelers

Travelers represent the largest group of stakeholders who will interact with the TMS. They have the most fundamental needs associated with navigating roadways within the project area during events, incidents and flooding. They are the group for whom the TMS is being developed so that their travel is safer and more efficient.

- 3.1.1 **When entering the area for an event** at Canterbury Park, Mystic Lake Casino or Valleyfair, travelers will **see static and dynamic signs** guiding them toward the safest, most efficient access to the event venue. (Need 1)
- 3.1.2 As travelers approach the area on Hwy 169 for events at Canterbury Park or Mystic Lake Casino, they will be **directed by dynamic signs** to proceed on Hwy 169 or take alternate routes (CR 101 or CR 17) based on current traffic. (Needs 1, 4)
- 3.1.3 After selecting Hwy 169 or an alternate route, travelers will be further **directed by primarily static and select dynamic signs** to proceed on local roads to Canterbury Park or Mystic Lake Casino. (Needs 1, 4)
- 3.1.4 As travelers approach the area on Hwy 169 for events at Valleyfair, they will be **informed by dynamic signs** of traffic queues along CR 101 based on current traffic. (Need 1)

- 3.1.5 **When leaving the area following an event** at Canterbury Park, Mystic Lake Casino or Valleyfair, travelers will **see static and dynamic signs** to guide them toward the safest, most efficient access to Hwy 169 via local roads. (Need 1)
- 3.1.6 **When entering or driving through the area during an incident**, travelers will be **informed by dynamic signs** of congestion. (Need 1)
- 3.1.7 **When entering the area to cross the Minnesota River during flooding**, travelers will be **directed by dynamic signs** to take alternate routes (CR 101 or Hwy 169) based on the flood status of CR 41. (Needs 1, 4)

3.2 Event Venues

Canterbury Park, Mystic Lake Casino and Valleyfair have staff responsible for the operation and administration of events hosted by their venue. They are concerned with travelers having a positive experience when arriving for, attending, and leaving an event.

- 3.2.1 **Prior to an event attracting more than 4,500 visitors**, the hosting event venue will provide information about the event to SMSC, Shakopee, Scott County and MnDOT to **prepare for traffic management and notify others** in the area (e.g. MVTA, large employers) of potential impacts. (Needs 2, 10, 16)
- 3.2.2 **When travelers enter the area for an event**, event venues will **observe traffic via camera views and detected traffic flows as needed 24/7/365**. (Needs 3, 14)
- 3.2.3 Event venues will **provide signing on their property** to support the direction of travelers when entering or leaving their venues. (Needs 5, 9, 11, 13)
- 3.2.4 Event venues will **coordinate, as needed, with Scott County and Shakopee Police Department** during events to ensure that travelers are directed to the safest, most efficient routes for accessing and leaving their venues. (Needs 2, 5, 14)

3.3 Shakopee Mdewakanton Sioux Community (SMSC)

The SMSC is a federally recognized, sovereign Native American tribe and as such they are responsible for infrastructure on tribal lands within the project area. SMSC also owns and operates the Mystic Lake Casino.

- 3.3.1 **Prior to an event attracting more than 4,500 visitors**, the SMSC will receive information about the event from the hosting venue to **prepare for traffic management and notify others** in the area (e.g. MVTA, large employers) of potential impacts. (Needs 2, 10, 16)
- 3.3.2 **When travelers enter the area for an event**, SMSC will **observe traffic via camera views and detected traffic flows**. (Needs 3, 14)
- 3.3.3 SMSC will **manage the provision of signing on the Mystic Lake Casino property** to support the direction of travelers when entering or leaving the venue property. (Needs 5, 9, 11, 13)

3.4 City of Shakopee

The City of Shakopee Public Works, Planning and Police Department staff are responsible for the safety and efficiency of city streets within the project area. The Police Department is actively involved in traffic management for the large events hosted by Canterbury Park, Mystic Lake Casino and Valleyfair. As such, they are expected to be a primary user of the TMS, while the rest of the City staff are expected to be secondary users.

- 3.4.1 **Prior to an event attracting more than 4,500 visitors**, Shakopee will receive information about the event from the hosting venue to **prepare for traffic management and notify others** in the area (e.g. MVTA, large employers) of potential impacts. (Needs 2, 10, 16)
- 3.4.2 Shakopee will **provide static signing on city streets** to support the direction of travelers when entering or leaving the area for an event. (Needs 5, 9, 11, 13)
- 3.4.3 **When travelers enter the area for an event or during incidents and flooding**, Shakopee Police Department will **observe traffic in real-time via cameras with full control and detected traffic flows as needed 24/7/365**. (Needs 3, 14)
- 3.4.4 **As travelers enter or leave the area for an event or during incidents and flooding**, Shakopee Police Department will **dynamically direct traffic to alternate routes** by activating operational plans in the TMS **as needed 24/7/365**. (Needs 3, 5, 11)
- 3.4.5 Shakopee Police Department will manage signal timing along CR 83 by **activating operational plans in the TMS** based on traffic when travelers are entering or leaving the area for an event or during incidents and flooding. (Needs 6, 12)
- 3.4.6 Shakopee Police Department will **monitor traffic volumes and train movements** along CR 101 to identify when CR 101 is not a favorable alternate route. (Needs 7, 8)
- 3.4.7 When Shakopee Police Department activates operational plans in the TMS for an event, incident or flooding, they will **notify and coordinate with Scott County and MnDOT**. (Needs 5, 6, 11, 12)

3.5 Scott County

The Scott County Roads and Transportation, and Information Technology staff are responsible for the safety and efficiency of the county roads within the project area. The County is expected to install and maintain the TMS, and when events occur during business hours, they are expected to be a primary user of the system.

- 3.5.1 **Prior to an event attracting more than 4,500 visitors**, Scott County will receive information about the event from the hosting venue to **prepare for traffic management and notify others** in the area (e.g. MVTA, large employers) of potential impacts. (Needs 2, 10, 16)
- 3.5.2 Scott County will **maintain the TMS** so that it is available for monitoring and dynamically directing traffic during events **as needed 24/7/365**. (Need 3)
- 3.5.3 Scott County will **provide static signing on county roads** to support the direction of travelers when entering or leaving the area for an event. (Needs 5, 9, 11, 13)

- 3.5.4 During business hours, **when travelers enter the area for an event or during incidents and flooding**, Scott County will **observe traffic in real-time via cameras with full control and detected traffic flows**. (Needs 3, 14)
- 3.5.5 During business hours, **as travelers enter or leave the area for an event or during incidents and flooding**, Scott County will **dynamically direct traffic to alternate routes** by activating operational plans in the TMS. (Needs 3, 5, 11)
- 3.5.6 During business hours, Scott County will manage signal timing along CR 83 by **activating operational plans in the TMS** based on traffic when travelers are entering or leaving the area for an event or during incidents and flooding. (Needs 6, 12)
- 3.5.7 During business hours, Scott County will **monitor traffic volumes and train movements** along CR 101 to know when CR 101 is not a favorable alternate route. (Needs 7, 8)
- 3.5.8 When Scott County activates operational plans in the TMS for an event, incident or flooding, they will **notify and coordinate with Shakopee Police Department and MnDOT**. (Needs 5, 6, 11, 12)
- 3.5.9 Scott County will **monitor for current performance and changes in future traffic** caused by new businesses or other activities that may impact traffic in the area and require a change in the TMS. (Need 15)

3.6 MnDOT

MnDOT staff at the Regional Transportation Management Center and in Traffic Engineering are responsible for the safety and efficiency of the state highways in the project area. There will be components of the TMS owned and operated by MnDOT so the group is expected to be a secondary user of the system.

- 3.6.1 **Prior to an event attracting more than 4,500 visitors**, MnDOT will receive information about the event from the hosting venue to **prepare for traffic management and notify others** in the area (e.g. MVTA, large employers) of potential impacts. (Needs 2, 10, 16)
- 3.6.2 MnDOT will **provide static guide signing on state highways** to support the direction of travelers when entering or leaving the area for an event. (Needs 5, 9, 11, 13)
- 3.6.3 **When travelers enter the area for an event or during incidents and flooding**, MnDOT will **observe traffic via camera views and detected traffic flows as needed 24/7/365**. (Needs 3, 14)
- 3.6.4 **As traffic enters or leaves the area for an event or during incidents and flooding**, MnDOT will **dynamically direct travelers on Hwy 169 and Hwy 13 to alternate routes** according to the operational plans in the TMS. (Needs 3, 5, 11)
- 3.6.5 When MnDOT directs travelers on Hwy 169 or Hwy 13 to alternate routes according to the operational plans in the TMS for an event, incident or flooding, they will **notify and coordinate with Scott County and Shakopee Police Department**. (Needs 5, 6, 11, 12)

3.7 Operational Roles and Responsibilities

Based on the operational concept, this section summarizes the potential roles and responsibilities for the stakeholders who will operate or contribute to the operation of the TMS. The roles and responsibilities described in Table 2 are intended to maintain consistency and familiarity among the stakeholders who will ultimately make the TMS operate effectively and efficiently. As operational plans are more formally developed for the TMS, these roles and responsibilities will be discussed again and may be further modified. The roles and responsibilities presented here should be viewed as a starting point for that discussion.

Table 2 Potential Roles and Responsibilities

Stakeholder	Role / Responsibility
Scott County	Coordinate notification of others in the area when events are planned. (3.5.1)
	Coordinate with event venues, Shakopee Police Department and MnDOT to review and select operational plans appropriate for events. (3.5.1)
	Monitor traffic using cameras and full control (e.g. pan, tilt, zoom) capabilities. (3.5.4, 3.5.7)
	Monitor traffic using flow data from detectors. (3.5.4, 3.5.7)
	Based on observed traffic conditions, activate operational plans in TMS. (3.5.5, 3.5.6)
	Notify and coordinate activation of operation plans with Shakopee Police Department and MnDOT. (3.5.8)
	Maintain TMS components to ensure 24/7/365 availability. (3.5.2) *
	Periodically review static signing on all roads to ensure that signs support direction of travelers as specified in operational plans. (3.5.3)
	Periodically review operational plans and current traffic for performance impacts that may require changes in operational parameters. (3.5.9)
Shakopee Police Department	Coordinate with event venues, Scott County and MnDOT to review and select operational plans appropriate for events. (3.4.1)
	Monitor traffic using cameras and full control (e.g. pan, tilt, zoom) capabilities. (3.4.3, 3.4.6)
	Monitor traffic using flow data from detectors. (3.4.3, 3.4.6)
	Based on observed traffic conditions, activate operational plans in TMS. (3.4.4, 3.4.5)
	Notify and coordinate activation of operation plans with Scott County and MnDOT. (3.4.7)
MnDOT	Coordinate with event venues, Shakopee Police Department and Scott County to review and select operational plans appropriate for events. (3.6.1)
	Based on coordination with Scott County or Shakopee Police Department, activate DMS on Hwy 169 or Hwy 13 according to operational plans in TMS. (3.6.4)
	Notify and coordinate activation of operation plans with Scott County and Shakopee Police Department. (3.6.5)
Event Venues	Notify Scott County, Shakopee Police Department and SMSC of upcoming events. (3.2.1)
	Coordinate with Scott County and Shakopee Police Department during events as needed. (3.2.4)

** Additional detail regarding the maintenance of specific TMS components is provided in the next section.*

4. System Components

Based on the operational concept and needs described in the previous sections, this section presents a list of proposed system components and an overview of the support responsibilities that may be associated with each. The components list and subsequent maintenance responsibilities will be discussed again and may be further modified during design and procurement of the final system. The information provided at this stage is intended as a starting point for stakeholders to discuss the scale and scope of ongoing support that will be required for the TMS.

4.1 Component List

Table 3 provides a list of potential components that could function together as parts of the TMS. Each component is listed under a primary function. A general description of the component and the potential locations where it may be placed are also provided. Some of the components already exist within the project area and they are noted here to associate them with the new components that may be added for the complete TMS installation.

Table 3 System Components

Function	Component	Description	Potential Locations
Monitoring	Camera	Existing cameras are located along Hwy 169, operated by MnDOT and available for viewing only. Additional cameras operated by Scott County and Shakopee Police Department will have pan/tilt/zoom features to offer visual monitoring for the TMS.	Key points along Hwy 169, CR 83 and CR 101 to monitor traffic.
	Detection	Devices used to identify vehicles and determine traffic volumes.	Key points along Hwy 169, CR 83, CR 101 and the Union Pacific Railway line to monitor traffic volumes and trains. Train traffic could also be monitored with cameras instead of detection.
	Traffic Signals	Existing lights used to manage traffic at intersections operated by Scott County and MnDOT.	Key points along CR 83 and CR 101.
Processing	Control Software	Software used to process data gathered from monitoring devices to activate dissemination devices according to predefined operational plans.	Shakopee Police Department and Scott County offices. Software may also be accessed via the Internet by other stakeholders for viewing purposes.
Dissemination	Dynamic Message Signs (DMS)	Existing DMS are located along Hwy 169 and operated by MnDOT. Additional DMS	Key points along Hwy 169, CR 83, CR 101 and event venue property.

Function	Component	Description	Potential Locations
		operated by Scott County and Shakopee Police Department will provide information to travelers.	
	Static Signs	Signs used to convey unchanging information and general directions.	Key points along Hwy 169, CR 83, CR 101, CR 17, CR 21, city streets and event venue property.

4.2 Maintenance Support and Responsibilities

Each component of the proposed TMS will require deployment, operations and maintenance activities to support their function. The operational roles associated with the system were described in a previous section. Table 4 now describes some of the more likely activities that will be required to maintain various components of the TMS. This is not an all-inclusive list of activities as there will be additional maintenance specified by manufacturers of the specific technologies that are ultimately chosen for the TMS. It is also assumed that all of these activities will be performed by Scott County; however, the County may also choose to contract all or some of the activities to another party. As with the previous sections, this list is intended as an initial reference point for Scott County to begin understanding the ongoing maintenance implications of the TMS.

Table 4 Maintenance Activities for System Components

Component	Maintenance Activity
Camera	<ul style="list-style-type: none"> • Lens cleaning • Check pan/tilt/zoom features • Check wiring and cable, harnesses and connectors for wear • Check monitors for burn-in or distortion • Management of recorded video
Detection	<ul style="list-style-type: none"> • Surface cleaning for exposed elements • Calibration and adjustment to ensure accuracy and detection zone • Testing to check for accuracy in counting • Management of recorded detector data
Control Software	<ul style="list-style-type: none"> • Testing to check for accuracy in performing operations • Monitor performance of operational plans • Administrative adjustments to operational parameters • Maintenance of user access and authorizations • Maintenance of software and associated servers and databases
DMS	<ul style="list-style-type: none"> • Remove dust and dirt from exposed elements • Clean display screen • Check wiring and cable, harnesses and connectors for wear • Check mounting structures for overall stability • Testing to ensure all pixels are working and to check for accuracy and timeliness in displaying information
Static Signs	<ul style="list-style-type: none"> • Overall maintenance of signs and structural supports

4.3 Performance Measures

Establishing performance measures is helpful for setting and managing expectations for how the TMS will operate. However, measures should be meaningful to a specific audience and should ultimately be

applicable to the goal for operating the system – to balance traffic during special events to reduce congestion and safety issues. In general, performance measures should be specific, measurable, agreed-upon, realistic and time-bound. Measures can be qualitative or quantitative. Following are three measures that have been established for the TMS. Scott County will assess the TMS according to these measures. The measures may also change over time as operational experience is gained or as performance reporting requirements for transportation agencies change.

Measure 1. Traveler complaints	
Target	Reduce traveler complaints regarding congestion during special events
Data	Customer comments
Data Source	Anecdotal feedback from event venue, Scott County and City of Shakopee staff
Analysis	Compare feedback from event prior to TMS operation to event after TMS operation
Reporting	Share summary during post-event debriefing

Measure 2. Event congestion	
Target	Reduce congestion during special events
Data	Observations
Data Source	Anecdotal feedback from Scott County, Shakopee, SMSC, MnDOT and event venues
Analysis	Compare feedback from event prior to TMS operation to event after TMS operation
Reporting	Share summary during post-event debriefing

Measure 3. Event-related crashes	
Target	Reduce event-related crashes due to congestion during special events
Data	Crashes
Data Source	Shakopee Police Department crash reports
Analysis	Compare feedback from event prior to TMS operation to event after TMS operation
Reporting	Share summary during post-event debriefing

5. Operational Scenarios

Now that the needs have been identified and an operational concept has been described, along with the potential operational and maintenance roles and responsibilities, this final section presents operational scenarios that describe how the TMS may be used in actual situations that commonly occur in the project area. Scenarios are designed to help stakeholders understand how they may interact with the TMS and with one another during the situations that will most commonly require activation of the system. The scenarios generally describe the situation and identify which components may be used. Then the scenarios describe how the system performs and who interacts with the system in response to the actions performed before, during and after an event. The scenarios use times of day as a general reference to illustrate changing conditions over the passage of time. The scenarios also describe system performance only to the extent necessary for stakeholders to understand how the TMS will operate. Following is a brief summary of the scenarios that are featured in greater detail later in this section.

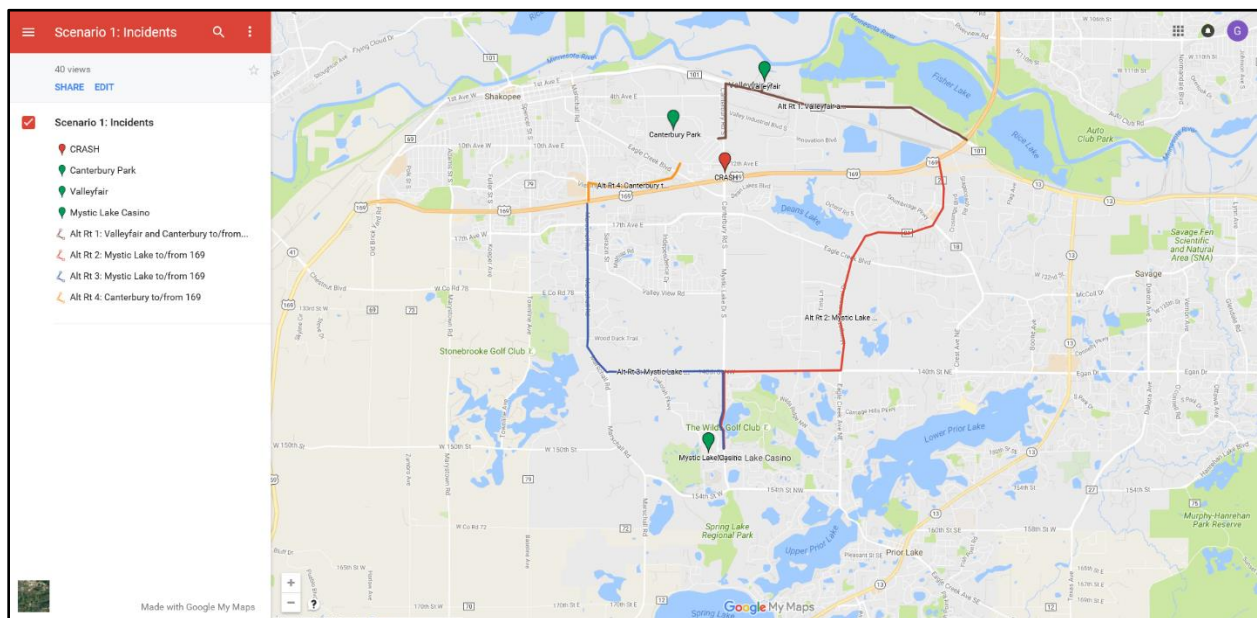
1. **Incidents.** During a normal day when there are no special events taking place in the area, there are still significant morning and afternoon peak periods of commuter traffic. If an unplanned incident (e.g. crash, stalled vehicle, pavement heave, etc.) were to occur, the TMS could be used to alert travelers of lane closures, detour or alternate routes.

2. **Valleyfair Special Events.** One of the most prominent annual events at Valleyfair is ValleySCARE at Halloween time. This event involves special operating hours and higher volumes of visitors. Operational plans for TMS use during these events may have unique details for alternate routes.
3. **Mystic Lake Casino Special Events.** Concerts, conferences and other events at Mystic Lake Casino can draw larger than usual volumes of visitors. The events can occur on any day of the week and during a wide variety of times. Operational plans for TMS use during these events may have unique details for alternate routes.
4. **Canterbury Park Special Events.** Concerts and special race day events (e.g. Father's Day) at Canterbury Park can create higher than usual numbers of visitors to the track. Canterbury Park also frequently serves as a parking point for large events at Hazeltine National Golf Club (e.g. 2016 Ryder Cup). The events primarily occur on the weekend and during a variety of times throughout the day. Operational plans for TMS use during these events may have unique details for alternate routes.
5. **Flooding.** It is common for flooding to occur in the Minnesota River Valley, especially around CR 41. When flooding occurs, more traffic tends to divert to the river crossing at CR 101. The TMS may be activated during these times to alert travelers of heavy congestion.

5.1 Scenario 1: Incidents

During a Tuesday in April, there are no scheduled special events at Valleyfair, Mystic Lake Casino, or Canterbury Park. However, at 4:45 pm during the afternoon commute peak period a traffic incident occurs at the intersection of NB CR 83 and the WB Hwy 169 exit ramp. As illustrated in Figure 3, the incident has closed NB CR 83 at Hwy 169 for approximately one hour. Shakopee Police Department will assist at the scene with directing traffic away from the incident and Scott County will use the TMS to monitor traffic (detectors and cameras) and activate DMS to alert travelers of the closure and alternate routes.

Figure 3 Scenario 1 Routes



Pre-Event Activities

- 1.1 Scott County, Shakopee Police Department, SMSC, MnDOT, Valleyfair, Canterbury Park and Mystic Lake Casino meet annually to review and discuss incident operation plans and identify staff that will operate the TMS during incidents and other events in the area.

Day of Event Activities

- 1.2 At 4:45 pm, Shakopee Police Department is notified of a crash at the intersection of NB CR 83 and the WB Hwy 169 exit ramp. The incident is blocking both lanes of NB CR 83. Shakopee Police Department is dispatched to the scene to assist those involved in the incident as additional emergency personnel arrive.
- 1.3 At 4:50 pm, as emergency personnel begin to assist those travelers involved in the crash, Shakopee Police Department begins directing the traffic that is still exiting Hwy 169 to SB CR 83. It is estimated that NB CR 83 will be closed for over an hour.
- 1.4 At 4:55 pm MnDOT RTMC staff is alerted by Shakopee Police Department of the incident. MnDOT RTMC staff use existing cameras on Hwy 169 at CR 83 and CR 18 to observe a queue building on the Hwy 169 exit ramp and the exit lane to CR 83. MnDOT RTMC staff posts a message to the proposed DMS on SB 169 regarding the congestion on Hwy 169 and directing traffic to alternate routes. MnDOT monitors the incident until they are notified by Shakopee Police Department that CR 83 is reopened.

Scott County provides static signing on WB CR 101 and SB CR 21 to Valleyfair, Canterbury Park and Mystic Lake Casino.

- 1.5 At 5:00 pm Scott County staff is alerted by Shakopee Police Department of the incident. Using the proposed cameras on NB CR 83, Shakopee Police Department and Scott County observe traffic queuing on NB CR 83 from Valley View Road to Hwy 169. The queue is also identified by the proposed detection on NB CR 83. Scott County posts a message on the proposed DMS at NB CR 83 of the road closure on NB CR 83 at Hwy 169 and directing traffic to alternate routes via NB CR 17 and NB CR 21. Scott County also sends a message to Valleyfair, Canterbury Park, Mystic Lake Casino and other traffic generators in the area (e.g. MVTA, large employers) to alert them of the incident.

Authorized users from event venues and MVTA access camera images to view traffic in and around the area. Mystic Lake Casino alerts guests of NB CR 83 closure and suggests NB CR 17 and NB CR 21 as alternate routes. Canterbury Park alerts guests about the NB CR 83 closure and suggests alternate routes via Eagle Creek Blvd and NB CR 83 (from Shenandoah Dr).

Scott County provides static signing on NB CR 17 and NB CR 21 to Hwy 169. The County also provides static signing on Eagle Creek Blvd, NB CR 83 and EB CR 101 to Hwy 169.

Scott County posts a message on the proposed DMS on WB CR 101 directing traffic to Canterbury Park.

Scott County monitors the incident until Shakopee Police Department notifies them that CR 83 is reopened.

- 1.6 At 5:55 pm the Shakopee Police Department reopens NB CR 83 at Hwy 169 and notifies MnDOT and Scott County.
- 1.7 At 6:05 pm MnDOT RTMC staff receives notification from Shakopee Police Department that the incident has cleared. Staff observes flowing traffic in the exit lane along WB Hwy 169 at CR 83 and removes the messages posted on the proposed DMS along SB 169.

Scott County receives notification from Shakopee Police Department that the incident has cleared. Staff observes that the traffic on NB CR 83 is flowing and removes the messages posted on the proposed DMS along NB CR 83.

Scott County also removes the message on the proposed DMS on WB CR 101.

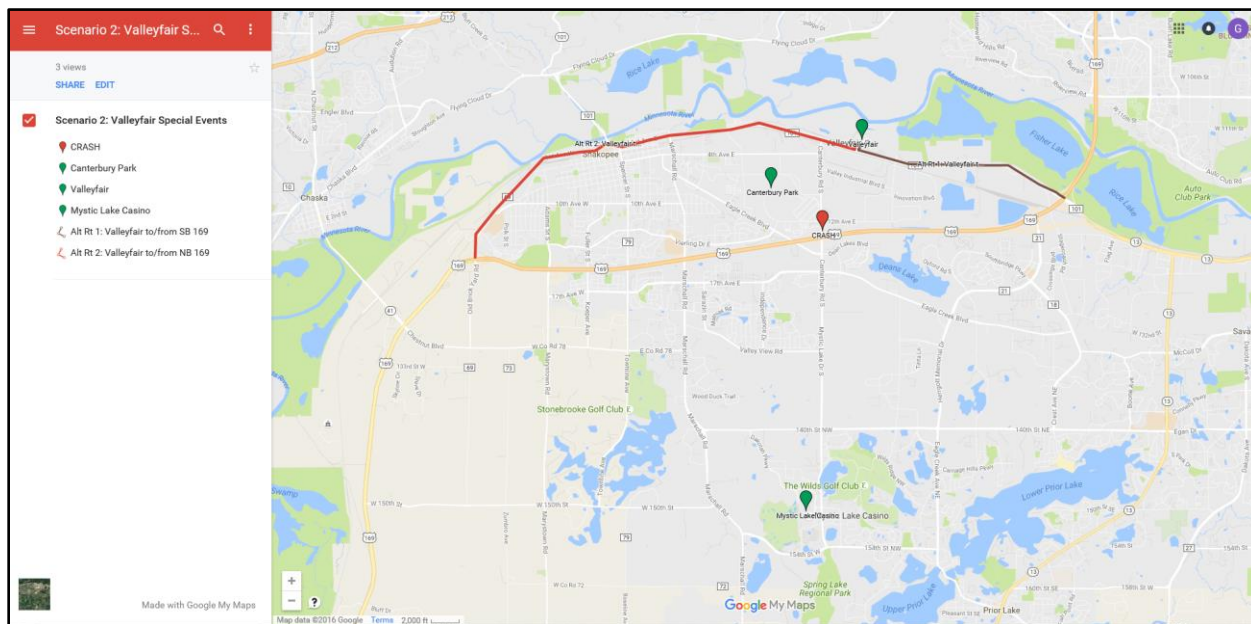
Post-Event Activities

- 1.8 Scott County, Shakopee Police Department and MnDOT meet via phone, email or person to debrief on the incident and identify any operating issues with the TMS or the actions taken to manage the incident.

5.2 Scenario 2: Valleyfair Special Events

During a Saturday in October, Valleyfair begins hosting their ValleySCARE event. Over 10,000 visitors will travel to the venue for this event which runs from 7:00 pm to 12:00 am (midnight), on select Fridays and Saturdays during the month of October. Traffic during the event varies throughout this window of time, with peaks from 6:00 pm to 9:00 pm as most visitors are dropped off at the venue. As illustrated in Figure 4, the TMS will be used to monitor vehicle traffic on Hwy 169 and CR 101, as well as train traffic on the rail line adjacent to CR 101. Signs will be activated as traffic starts to build to alert travelers of congestion. The TMS is not expected to be used for managing traffic after the event.

Figure 4 Scenario 2 Routes



Pre-Event Activities

- 2.1 Two weeks before the first event weekend, Valleyfair notifies Scott County and Shakopee Police Department with the event dates, times and anticipated traffic. Scott County, Shakopee Police Department, MnDOT and Valleyfair review the operations plan for Valleyfair Special Events in the TMS to ensure parameters for operation and notification are current.
- 2.2 One week before the first event weekend, notifications are pushed to other traffic generators in the area (e.g. MVTA, large employers), as well as SMSC, City of Shakopee, Scott County and MnDOT staff, alerting them of the anticipated traffic impacts.

Day of Event Activities

- 2.3 At 6:00 pm, Shakopee Police Department begins monitoring vehicle traffic along Hwy 169 and CR 101 using cameras that are accessed through the TMS software. Staff can pan, tilt and zoom the cameras to observe traffic and any incidents that may occur on the roadway during the event.
- 2.4 Around 6:30 pm, traffic builds to the point where traffic backs up onto CR 101 and Shakopee Police Department activates the operations plan for Valleyfair Special Events. The operations plan includes the activation of proposed DMS on SB Hwy 169, NB Hwy 169, WB CR 101, and NB CR 83 alerting travelers of congestion ahead.

Authorized users from event venues and MVTA access camera images to view traffic in and around the area.

- 2.5 At approximately 8:00 pm, traffic begins to ease and Shakopee Police Department deactivates the operations plan. Staff continue monitoring traffic for incidents.
- 2.6 As the event end time approaches around 12:00 am, Shakopee Police Department observes traffic leaving Valleyfair in higher volumes. Staff continue to monitor traffic for incidents.

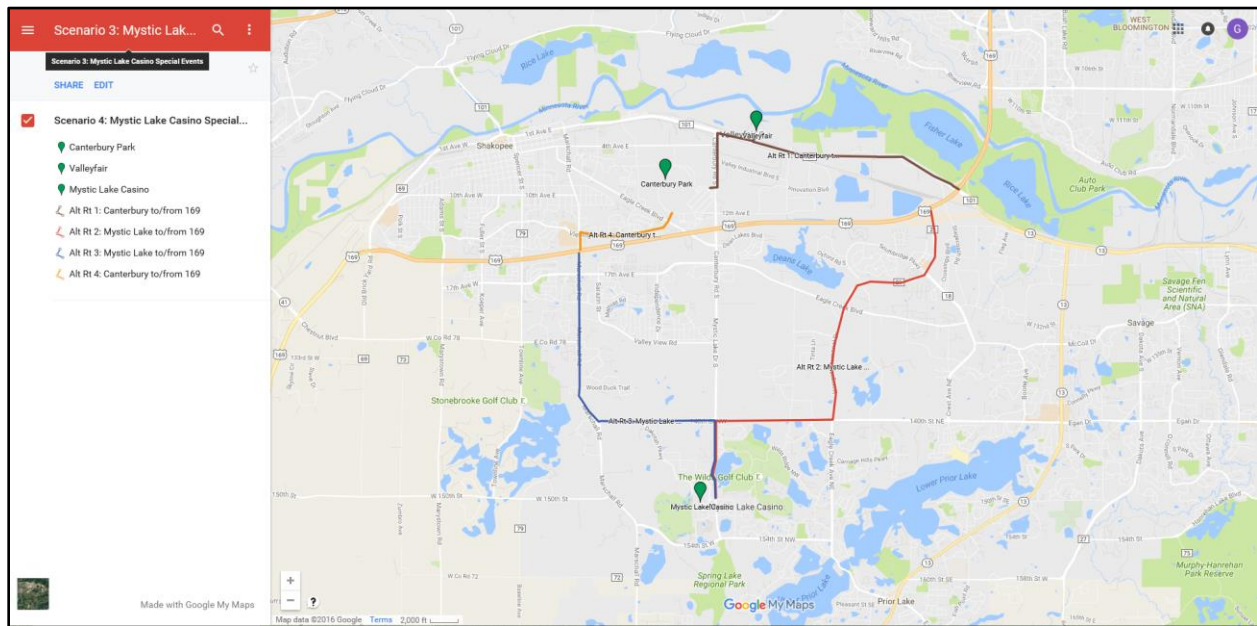
Post-Event Activities

- 2.7 One week after the events conclude, Scott County, Shakopee Police Department, MnDOT and Valleyfair meet via phone, email or in person to debrief and identify any operating issues with the TMS or the operations plan for Valleyfair Special Events.

5.3 Scenario 3: Mystic Lake Casino Special Events

Mystic Lake Casino hosts a number of concerts, festivals and other special events throughout the year. The number of visitors for these events can vary from 1,000 to over 15,000. Many of the events take place in the evenings or on weekends with traffic peaks as visitors arrive prior to the event and as they leave following the event. As illustrated in Figure 5, the TMS will be used to monitor vehicle traffic on Hwy 169 and CR 83. Signs will be activated to direct traffic to alternate routes as traffic builds. The TMS will also be used at the end of the event to once again monitor traffic and direct traffic to alternate routes.

Figure 5 Scenario 3 Routes



Pre-Event Activities

- 3.1 The most common traffic challenges experienced by visitors traveling to events at Mystic Lake Casino involve congestion around the Hwy 169 and CR 83 interchange. Congestion at the interchange worsens based on the size of the event and simultaneous events taking place at Canterbury Park. To address these challenges, Mystic Lake Casino will coordinate with Shakopee Police Department and Scott County prior to events.
- 3.2 Approximately one week before an event, notifications are pushed to other traffic generators in the area (e.g. MVTA, large employers), as well as SMSC, City of Shakopee, Scott County and MnDOT staff, alerting them of the anticipated traffic impacts.

Day of Event Activities

- 3.3 The TMS will then be used by Shakopee Police Department to monitor traffic on Hwy 169 during events. When congestion reaches a peak, the operations plan for Mystic Lake Casino Special Events may be activated to redirect southbound Hwy 169 traffic to exit at CR 21 and follow static signs to CR 82 and the Casino. Similarly, the TMS may redirect northbound Hwy 169 traffic to exit at CR 17 and follow static signs to CR 82 and the Casino.

Authorized users from event venues and MVTA access camera images to view traffic in and around the area.

- 3.4 As events conclude and traffic builds along northbound CR 83 heading to Hwy 169, the TMS may be activated again to redirect northbound CR 83 traffic to turn at CR 42 and head west to CR 17 and southbound Hwy 169, or head east to CR 21 and northbound Hwy 169.

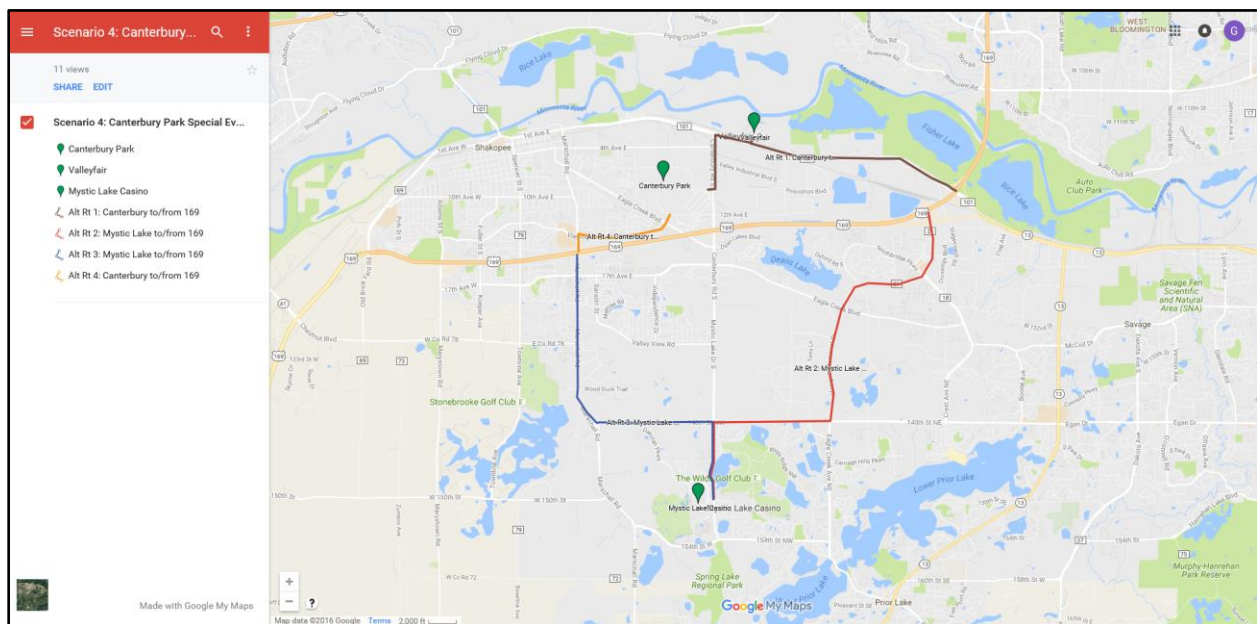
Post-Event Activities

- 3.5 One week after the events conclude, Scott County, Shakopee Police Department, MnDOT, SMSC and Mystic Lake Casino meet via phone, email or in person to debrief and identify any operating issues with the TMS or the operations plan for Mystic Lake Casino Special Events.

5.4 Scenario 4: Canterbury Park Special Events

In late July, Canterbury Park hosts the Vans Warped Tour, a concert featuring several rock bands, that is estimated to draw up to 15,000 visitors to the area. The concerts begin at 11:00 am and end at 10:00 pm. Traffic during the event varies throughout this window of time with peaks at the beginning and end. As illustrated in Figure 6, the TMS will be used to monitor vehicle traffic on Hwy 169, CR 83, CR 101, as well as train traffic on the rail line adjacent to CR 101. Signs will be activated to direct traffic to alternate routes as traffic builds. The TMS will also be used at the end of the event to once again monitor traffic and direct traffic to alternate routes.

Figure 6 Scenario 4 Routes



Pre-Event Activities

- 4.1 Two weeks before the first event weekend, Canterbury Park notifies Scott County and Shakopee Police Department with the event dates, times and anticipated traffic. Scott County, Shakopee Police Department, MnDOT and Canterbury Park review the operations plan for Canterbury Park Special Events in the TMS to ensure parameters for operation and notification are current.
- 4.2 One week before the first event weekend, notifications are pushed to area businesses, as well as SMSC, City of Shakopee, Scott County and MnDOT staff, alerting them of the anticipated traffic impacts.

Day of Event Activities

- 4.3 At 9:00 am, Shakopee Police Department begins monitoring vehicle traffic along Hwy 169, CR 83 and CR 101 using cameras that are accessed through the TMS software. Staff can pan, tilt and zoom the cameras to observe traffic and any incidents that may occur on the roadway during

the event. Cameras operated by MnDOT will be available in view only mode, without control options.

Canterbury Park activates a portable DMS on 12th Ave E at Vierling Dr E to direct travelers entering Canterbury Park to designated parking for live racing and for the concert.

Authorized users from event venues and MVTA access camera images to view traffic in and around the area.

- 4.4 Around 10:30 am, congestion builds to the point where traffic backs up onto Hwy 169 at the CR 83 exit and Shakopee Police Department activates the operations plan for Canterbury Park Special Events. The operations plan includes the activation of proposed DMS on SB Hwy 169, NB Hwy 169, and WB CR 101 alerting travelers to use alternate routes to access Canterbury Park.
- 4.5 At 10:35 am, MnDOT RTMC is alerted by Shakopee Police Department of the increased congestion along Hwy 169 at CR 83. MnDOT RTMC staff use existing camera on Hwy 169 at CR 83 and CR 18 to observe a queue building on the Hwy 169 exit ramp and the exit lane to CR 83. MnDOT RTMC staff posts a message to the proposed DMS on SB 169 and NB 169, and existing DMS on WB Hwy 13 at Chowen Ave regarding the congestion and directing traffic to alternate routes. MnDOT monitors the incident until they are notified by Shakopee Police Department that CR 83 is reopened.

Using the proposed cameras on NB CR 83, Shakopee Police Department and Scott County observe traffic queuing on NB CR 83. The queue is also identified by the proposed detection on NB CR 83. Shakopee Police Department posts a message on the proposed DMS at NB CR 83 of the congestion on NB CR 83 at Hwy 169 and directing traffic to alternate routes via NB CR 17 and NB CR 21.

Shakopee Police Department also posts a message on the proposed DMS at NB CR 83 near 12th Ave E, directing traffic to the alternate entrance to Canterbury Park at Barescheer Blvd.

Scott County provides static signing on WB CR 101, SB CR 83, NB CR 17, and EB CR 101 to Canterbury Park.

- 4.6 Around 1:00 pm, peak traffic arriving for the event tapers off. Shakopee Police Department deactivates the operations plan in the TMS and continues to monitor traffic throughout the day.
- 4.7 At 9:30 pm, Canterbury Park coordinates with Shakopee Police Department to activate the operations plan for traffic leaving the event venue once the concert ends at 10:00 pm. Proposed DMS along Eagle Creek Blvd and 12th Ave E are activated to direct traffic to alternate routes for accessing Hwy 169. This alleviates traffic concentrations at the intersection of 12th Ave E and CR 83, and CR 83 and Hwy 169.

Canterbury Park also has static signing around their parking facility directing traffic to alternate exit points along Barescheer Blvd and Shenandoah Dr.

Shakopee and Scott County provide static signing along Barendsheer Blvd, Shenandoah Dr and CR 101 directing travelers to Hwy 169.

- 4.8 By 11:30 pm, traffic has dispersed and Shakopee Police Department deactivates the operations plan in the TMS.

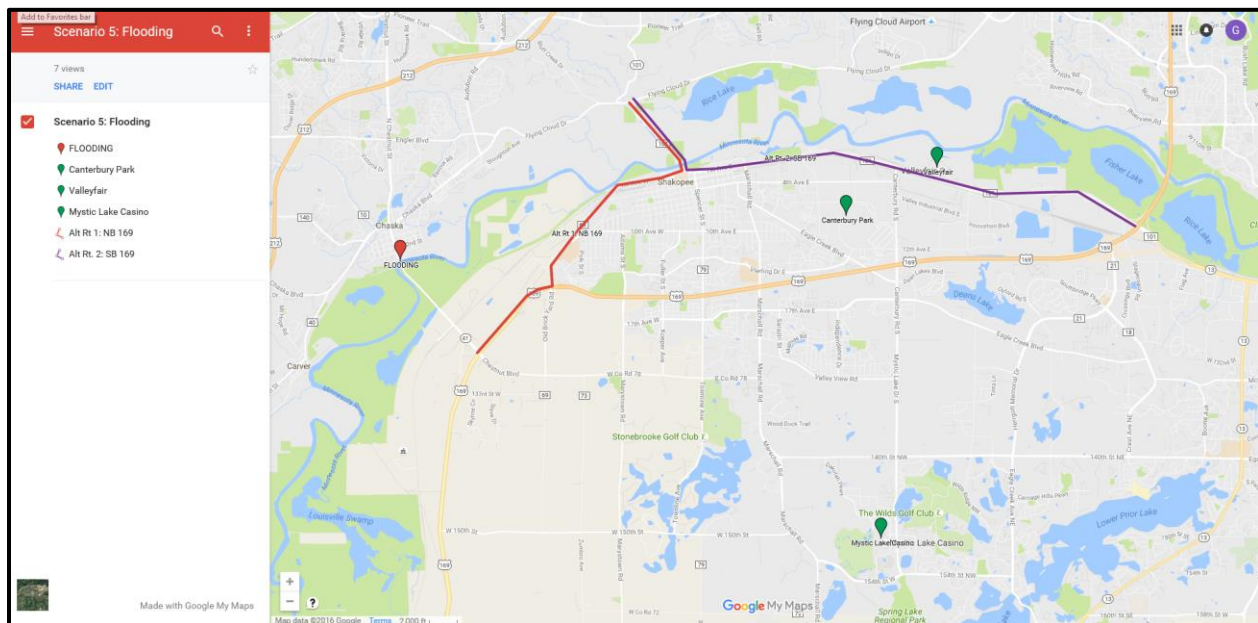
Post-Event Activities

- 4.9 One week after the event, Scott County contacts Shakopee Police Department, MnDOT and Canterbury Park via phone, email or in person to debrief and identify any operating issues with the TMS or the operations plan for Canterbury Park Special Events.

5.5 Scenario 5: Flooding

After several days of unseasonably warm weather causing snowmelt and heavy rains in March, the Minnesota River has reach flood stage in several locations. On a Thursday morning, MnDOT determines that Hwy 41 will need to be closed at the bridge crossing the Minnesota River. As illustrated in Figure 7, traffic will need to be diverted to alternate routes at CR 101 and Hwy 169 to cross the Minnesota River. MnDOT will manage this scenario and coordinate with Shakopee Police Department and Scott County to direct traffic away from Hwy 41, using the TMS to monitor traffic (detectors and cameras) and activate DMS to alert travelers of the closure and alternate routes.

Figure 7 Scenario 5 Routes



Pre-Event Activities

- 5.1 Scott County, Shakopee Police Department, SMSC, MnDOT, Valleyfair, Canterbury Park and Mystic Lake Casino meet annually to review and discuss the flooding operation plan and identify staff that will operate the TMS during flooding in the area.
- 5.2 As the Minnesota River approaches flood stage and MnDOT anticipates the closure of Hwy 41, they coordinate with Shakopee Police Department and Scott County regarding the pending closure.

Day of Event Activities

- 5.3 At 8:30 am, MnDOT notifies Shakopee Police Department and Scott County that Hwy 41 will be closed by noon that day.

- 5.4 At 9:30 am, Scott County activates the operations plan for flooding in the TMS. This prompts MnDOT to activate proposed DMS on NB Hwy 169 alerting travelers to take proceed on Hwy 169 or use CR 101 as alternate river crossings.

From 9:00 am to 11:00 am, MnDOT staff install barricades and temporary static signing around the bridge to effectively close the crossing.

Scott County begins monitoring traffic via cameras along CR 101 and MnDOT monitors traffic along Hwy 169 to ensure that traffic is moving smoothly toward and through the alternate river crossings.

Authorized users from event venues and MVTA access camera images to view traffic in and around the area.

- 5.5 Hwy 41 remains closed for one week. Throughout the week, Scott County and MnDOT continue to monitor traffic along the alternate river crossing at CR 101 and Hwy 169.

- 5.6 At 3:00 pm on the following Thursday, MnDOT determines that Hwy 41 can be reopened and they notify Shakopee Police Department and Scott County that the road will be reopened by 8:00 am Friday morning.

From 5:00 am to 7:00 am, MnDOT staff remove barricades and temporary static signing around the bridge. Once signs and barricades have been removed, MnDOT notifies Scott County and the TMS operations plan for flooding is deactivated. Traffic resumes crossing the Minnesota River at Hwy 41.

Post-Event Activities

- 5.7 Scott County, Shakopee Police Department and MnDOT meet via phone, email or person to debrief on the flooding closures and identify any operating issues with the TMS or the operations plan for flooding.